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A METHOD FOR STRUCTURING FINANCIALLY FEASIBLE TERM LOANS

Charles M. Linke, Associate Professor,
Department of Finance

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College of Commerce and Business Administration
University of Illinois at Urbana-Champaign

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Summary:

This paper develops and demonstrates a simple model for assessing the compatibility of a term borrower's operational methods, financial structure, and sales growth strategies with a scheduled term loan repayment period and possible term loan covenants. The impact of inflation upon a financially feasible term loan structure is also examined.

A METHOD FOR STRUCTURING FINANCIALLY FEASIBLE TERM LOANS

Significant work has been directed toward assessing the benefits and costs of various types of loan covenants to lenders and borrowers. However, the problem of structuring a financially feasible term loan has not attracted attention. The purpose of this paper is to demonstrate a simple model for assessing the compatibility of a term borrower's operational methods, financial structure, and sales growth strategies with a scheduled term loan repayment period.

Proceeds of seasonal loans are used to acquire inventory type assets whose subsequent sale provide the means of loan repayment. With term loans, the proceeds are used to increase working capital and fixed assets, or reduce liabilities. The normal repayment source for a term loan is from profits retained in the business. Competing uses for these same profit dollars include the need for funds to finance sales growth and owners' desire for dividends. Clearly, significant interdependencies exist between a firm's sales growth rate, its sales per dollar of assets employed, its dividend and leverage policies, and its ability to meet the debt service requirements of a term loan with a particular maturity.

The dynamics and complexity of term lending cause most lenders to request term loan applicants to submit formal financial projections. Typically these projections are confined to a "most likely" set of assumptions and do not explore various alternative "pessimistic" or "optimistic" assumptions. The model presented here for structuring a financially feasible term loan is not intended to substitute for formal financial projections. However, the model does identify the important

interdependencies between financial and operating variables in the same way formal projections do. Further, the model is easier and quicker to use than formal projections which means the implications of alternative assumptions with respect to sales growth, loan maturity, and loan covenants, can be examined.

A model for specifying a firm's financially feasible rates of sales growth is developed in section one. This model is expanded in section two to incorporate the impact the debt servicing requirement of a term loan has upon a firm's financially feasible rates of sales growth. The impact of inflation upon a financially feasible term loan structure is examined in the third section. Concluding observations comprise the final section.

SPECIFYING A FIRM'S FINANCIALLY FEASIBLE RATE OF SALES GROWTH

Various approaches to estimating a firm's sustainable sales growth rate can be found in [1], [2], [3], [4], [5], and [7]. The models are quite similar and revolve around the straightforward logic that uses of funds associated with sales growth must be equal to sources of funds available to finance growth. Equation (1) expresses this equality in terms of the change in uses and sources relative to the change in sales,

$$(1) \qquad \frac{\Delta CA_t}{\Delta S_t} + \frac{\Delta NFA_t}{\Delta S_t} = \frac{\Delta CL_t}{\Delta S_t} + \frac{\Delta LTL_t}{\Delta S_t} + \frac{\Delta CS_t}{\Delta S_t} + \frac{\Delta RE_t}{\Delta S_t}$$

where

ΔS_t = the growth in sales = $S_t - S_{t-1}$,

ΔCA_t = the increase in current assets,

ΔNFA_t = the increase in net fixed assets,

ΔCL_t = the increase in current liabilities,

ΔLTL_t = the increase in long term liabilities,

ΔCS_t = the increase in common stock,

ΔRE_t = the increase in retained earnings

$= r(S_{t-1} + \Delta S_t)(1-p)$ where r is the net profit margin expressed on an after tax basis, and p is the dividend payout ratio.

Multiplying by ΔS_t and using the alternative expression for $\Delta RE_t/\Delta S_t$ yields

$$(2) \qquad \Delta S_t\left[\frac{\Delta CA_t}{\Delta S_t} + \frac{\Delta NFA_t}{\Delta S_t} - \frac{\Delta CL_t}{\Delta S_t} - \frac{\Delta LTL_t}{\Delta S_t} - \frac{\Delta CS_t}{\Delta S_t} - r(1-p)\right] = rS_{t-1}(1-p).$$

Defining the financially feasible growth rate g as $(\Delta S_t/S_{t-1})$, and rearranging equation (2) reveals

$$(3) \qquad \frac{\Delta S_t}{S_{t-1}} = g = \frac{r(1-p)}{\left(\frac{\Delta CA_t}{\Delta S_t} + \frac{\Delta NFA_t}{\Delta S_t}\right) - \left(\frac{\Delta CL_t}{\Delta S_t} + \frac{\Delta LTL_t}{\Delta S_t} + \frac{\Delta CS_t}{\Delta S_t}\right) - r(1-p)}.$$

Thus, a firm's supportable growth rate g is a function of its profitability (r) and retention policy (1-p), the asset intensiveness of its product generating function $[(\Delta CA_t + \Delta NFA_t)/\Delta S_t]$, its spontaneous sources of financing $(\Delta CL_t/\Delta S_t)$, and its longer term debt and equity financing policy.[1]

The growth rate model could be expressed more elegantly and compactly than in equation (3). However, in its present form it represents

an "opportunistic model" or forecasting procedure, which may use econometric estimating techniques, or subjective outlook information.

Perhaps an example will best demonstrate the robust qualities of this simple model for specifying feasible sales growth. Exhibit 1 contains actual (197t-1) and projected (197t) income statement and balance sheet data for Company X. The income statement and balance sheet projections for the "most likely" and "optimistic" sales projections are developed using the percent of sales forecasting technique. An analyst could estimate Company X's feasible sales growth rate on the basis of the actual 197t-1 income statement and balance sheet by assuming the percent of sales forecasting techniques is appropriate. Stated differently, an analyst might assume existing asset/sales, liability/sales and income/sales relationships will hold in the planning period for increments in sales. Using the 197t-1 income statement and balance sheet relationships for Company X in equation (3) shows

$$(3) \qquad g = \frac{.10(1-.5)}{(.30 + .20) - (.05 + 0 + 0) - .10(1 - .5)} = 12.5\%$$

The 12.5% financially feasible growth rate has a straightforward interpretation. It is the only sales growth rate that is consistent with an absence of new equity financing, and stable values for the asset/sales, liability/sales, and income/sales relationships depicted in Company X's financial statements. If sales growth is greater than 12.5%, the firm must restrict sales growth, and/or alter its asset and liability management practices, and/or sell equity or reduce the dividend payment.

The "most likely" sales projection in Exhibit 1 is for a 12.5% sales increase. The "most likely" projected balance sheet indicates the firm is able to pursue its operating asset and liability management

EXHIBIT 1: Specifying Company X's Financially Feasible Sales Growth

Income Statement	Actual 197t-1	Projected 197t	
		Most Likely	Optimistic
Sales	$100,000	$112,500	$120,000
Cost of Goods Sold	60,000	67,500	72,000
Gross Profit	40,000	45,000	48,000
Operating/Selling/ General Expenses	20,000	22,500	24,000
EBIT	20,000	22,500	24,000
- Interest	0	0	0
EBT	20,000	22,500	24,000
- Taxes (50%)	10,000	11,250	12,000
EAT	10,000	11,250	12,000
- Dividends	5,000	5,625	6,000
Retained Earnings	$ 5,000	$ 5,625	$ 6,000

Balance Sheet	Actual 12-31-197t-1	Projected 12-31-197t	
		Most Likely	Optimistic
Cash	$ 2,000	$ 2,250	$ 2,240
Accounts Receivable	10,000	11,250	12,000
Inventory	18,000	20,250	21,600
	30,000	33,750	36,000
Net Fixed Assets	20,000	22,500	24,000
	$ 50,000	$ 56,250	$ 60,000
Accounts Payable	$ 4,000	$ 4,500	$ 4,800
Accurrals	1,000	1,125	1,200
	5,000	5,625	6,000
Long Term Liabilities	0	0	0
Common Stock	10,000	10,000	10,000
Retained Earnings	35,000	40,625	41,000
	$ 50,000	$ 56,250	$ 57,000
		Funds Need	3,000
			$ 60,000

practices. However, if sales grow at a 20.0% rate under the optimistic projection, a funds need of $3,000 emerges.

The usefulness of this "opportunistic model" becomes apparent when objective and subjective outlook information are combined. For example, assume Company X's management believes that in the planning period:

(1) $\Delta inventory_t/\Delta sales_t$ will average only 70 percent of the historic inventory/sales relationship [or (.7)(.18)];[2] and

(2) one half of net fixed asset growth should be financed by term or installment sales loans, i.e.,

$$\Delta LTL_t/\Delta S_t = (.5)(\Delta NFA_t/\Delta S_t) = (.5)(.20).$$

Combining management's judgments regarding inventory and net fixed asset growth and the 197t-1 income statement and balance sheet relationships for Company X in equation (3) reveals

$$(3)\quad g = \frac{r(1-p)}{\left(\frac{\Delta Cash_t}{\Delta S_t} + \frac{\Delta A/R_t}{\Delta S_t} + \frac{\Delta Inv_t}{\Delta S_t} + \frac{\Delta NFA_t}{\Delta S_t}\right) - \left(\frac{\Delta CL_t}{\Delta S_t} + \frac{\Delta LTL_t}{\Delta S_t} + \frac{\Delta CS_t}{\Delta S_t}\right) - r(1-p)}$$

$$= \frac{.10(1-.5)}{(.02+.10+(.70)(.18)+.20) - (.05+(.50)(.20)+0) - .10(1-.5)}$$

$$= 20.33\%.$$

The increase in g from 12.50% to 20.33% arises due to the decline in Company X's inventory to sales relationship for incremental sales, and the adoption of a policy to use term loans to finance half of net fixed asset growth. However, this higher growth rate is estimated before consideration is given to the impact debt servicing requirements have upon g.

TERM LOAN MATURITY AND SALES GROWTH

Presumably, a term loan borrower uses loan proceeds to establish desired asset and liability positions relative to envisioned sales activity levels. Term loan interest and principal payments in t + 1, ..., t + n represent competing uses of the same profit dollars required to finance sales growth. A question naturally arises regarding the financial consistency between the term loan maturities requested by borrowers and/or established by lenders and the sales growth possibilities/objectives of borrowers.

Company X provides a convenient vehicle for examining the determinants of a financially feasible term loan maturity. Imagine Company X requests a $15,000 term loan to provide the financing required to purchase the stock of dissident shareholders. Company X's management desires to negotiate a term loan that will allow future sales growth of at least 10% per annum. The financially feasible sales growth model can be easily adapted to provide an estimate of the required loan maturity period if sales are to grow at 10% per year and operating asset/liability management policies are to remain unchanged.

To explore the issue of loan maturity, equation (3) needs to be modified as follows:

$$(3) \quad g = \frac{r(1-p)}{\underbrace{\left(\frac{\Delta CA_t}{\Delta S_t} + \frac{\Delta NFA_t}{\Delta S_t}\right)}_{a} - \underbrace{\left(\frac{\Delta CL_t}{\Delta S_t} + \frac{\Delta LTL_t}{\Delta S_t}\right)}_{\ell} - \underbrace{\left(\frac{\Delta CS_t}{\Delta S_t}\right)}_{s} - r(1-p)}$$

$$(4) \quad g = \frac{[(r/(1-t))-i(\Delta L_t/S_t)](1-t)(1-p)(X)}{a - \ell - s - r'(1-p)(X)} = \frac{r'(1-p)(X)}{a - \ell - s - r'(1-p)(X)}$$

where

t = income tax rate = 50% for Company X;

i = before tax interest rate on the term loan = 10%;

ΔL_t = the incremental LTL or term loan = \$15,000;

r' = net profit margin after incremental interest cost; and

X = the proportion of after tax profits retained in the firm that is required to support sales growth.

If g is set at the desired 10% growth level, X is equal to .8779 and (1-X) takes on the value of .1221.[3] The (1-X) value represents the proportion of after tax profits retained that is not required to finance growth. Stated differently, $[(1-X)r' S_t]$ represents the quantity of after tax profits retained that is available for repayment of the term loan principal.[4]

This repayment quantity will grow at the rate g over time.[5] The variable m in equation (5) represents the required maturity period in years for a non-level annual payment plan.

$$(5) \quad \text{Loan} = \text{Principal Payment}_t \left[1 + \sum_{t=2}^{m} (1+g)^{t-1}\right]$$

$$\$15,000 = [(1-X)r'(1-p)S_t]\left[1 + \sum_{t=2}^{m} (1+g)^{t-1}\right]$$

$$.13636\ S_t = [(.1221).0466\ S_t]\left[1 + \sum_{t=2}^{m} (1+g)^{t-1}\right]$$

$$22.965 = \sum_{t=2}^{m} (1+.10)^{t-1}$$

$$m = 12.8 \text{ years}$$

The $15,000 loan is shown in equation (5) both in its dollar amount and as a proportion of S_{t-1} to show the equation is applicable whether the question is stated in a specific dollar amount or relative to sales activity. Exhibit 2 illustrates the retention rates and term loan maturities consistent with sales growth rates of 5%, 10%, 15%, and 20% when the asset, liability, and profitability relationships of Company X are held constant at the actual 197t-1 levels. The loan maturity data suggest lenders will have little interest in the loan request unless Company X will agree to lower its dividend payout, and/or agree to restrain sales growth to less than 20% per annum. Lender apathy occurs because Company X will need to borrow continuously, instead of repaying, if sales growth exceeds 12.5% and a 50% payout policy is pursued. If lenders restrict maturities on stock repurchase loans to the 5-8 year range, then Company X must choose between current dividends and sales growth.

The Exhibit 2 data suggest the logic for dividend payout covenants and current ratio or working capital covenants which have the effects of restricting growth unless additional equity financing is undertaken. Working capital and debt/equity standards are common term loan covenants [6]. Explicit introduction of a dividend payment covenant is possible by varying p. The financial feasibility of other term loan covenants such as current ratio or working capital measures can be examined by varying coefficients in the model (i.e., $\Delta CA/\Delta S$ and $\Delta CL/\Delta S$) to reflect the proposed covenants.

Level payment loans would have longer maturities than the non-level payment loans shown in Exhibit 2. The reason for this is that the size of the payment, interest and principal, does not grow over time. Instead, the total payment is

EXHIBIT 2: Loan Maturities and Retention Rates Consistent with a $15,000 Loan and Sales Growth Rates of 5%, 10%, 15%, and 20% for Company X

Retention Rate (1-p)	Loan Maturity Period with Sales Growth Rate (g) of 5%	10%	15%	20%
.25	26.3 Years	Borrowing Need	Borrowing Need	Borrowing Need
.50	5.5 Years	12.8 Years	Borrowing Need	Borrowing Need
.75	2.8 Years	4.0 Years	8.4 Years	Borrowing Need
1.00	1.9 Years	2.4 Years	3.4 Years	6.2 Years

$$(6) \qquad \text{Loan Payment} = \frac{\text{Loan}}{\sum_{t=1}^{m} \frac{1}{(1+i)^t}} = \frac{(i)\ \text{Loan}}{1 - \frac{1}{(1+i)^m}}.$$

The maximum possible interest plus principal payment at the end of year one (or year t) would likely set the upper bound for the payment size with a level payment loan.[6]

Exhibit 2 depicts but one of the possible tradeoffs between scheduled loan maturity and variables amenable to the control of Company X's management. Similar interdependencies exist between sales growth, feasible loan maturity, and Company X's asset investment per dollar of sales, leverage policy, and profitability. For example, if changes in current asset and fixed asset management policies reduce $[(\Delta CA_t/\Delta S_t) + (\Delta NFA_t/\Delta S_t)]$ from the .5 historical value to an expected .35, then Company X can continue a 50% earnings payout, repay the $15,000 stock acquisition loan in 9.1 years, and still enjoy an annual 15% sales growth rate. Without the asset management change, Company X could not repay the loan while growing at 15% and paying out 50% of earnings. Indeed, as Exhibit 2 reveals, Company X would have needed to borrow continuously to finance a 15% growth rate.

The model is sufficiently adaptable to permit users to incorporate coefficients for a, l, s, r, p, t, and i that reflect specific scenarios of future developments. However, the model does not give explicit consideration to the impact of inflation upon the ability of a firm to service debt.

STRUCTURING TERM LOANS DURING INFLATION

It is essential that management and lenders understand the effects of inflation on capital investment and earning power. The primary effects that are relevant to this study are (1) the inflation induced increases in working capital and (2) the underdepreciation of fixed assets. The feasible sales growth model and feasible term loan structure logic can be modified to give consideration to these inflation effects.

The impact of inflation upon the working capital needs of a business revolves around the management of inventory and accounts receivable. To the extent that a constant collection period is maintained under inflation, then the firm will always have (n) days sales outstanding in the form of accounts receivable. As such, the annual increase in the investment in receivables under inflation will be directly proportional to the combined real and nominal increase in sales. The growth rate of sales under inflation, g*, is

$$(7) \qquad g^* = \frac{\Delta S_t}{S_{t-1}} = \frac{S_{t-1}(1+f)+g[S_{t-1}(1+f)]-S_{t-1}}{S_{t-1}} = [(1+f)(1+g)-1]$$

where g is the real growth in sales and f represents the rate of inflation. As long as a firm's collection period remains constant, the growth in receivables will be g*, and (Δ Acc. $Rec._t/\Delta S_t$) will remain constant over time.

Inflation's impact on inventory is exactly the same as with receivables. If a constant inventory turnover assumption is appropriate, then the investment in inventory will grow at g*, and the ($\Delta Inventory_t/\Delta S_t$) coefficient will be constant over time.

A portion of the increase in investment in inventories and receivables will be financed by the increase in the spontaneous financing sources--accounts payable and accruals. To the extent a firm's product generating function does not change under inflation, then $(\Delta CL_t/\Delta S_t)$ will not change with inflation and current liabilities will also grow at g*.

Underdepreciation of fixed assets occurs during inflation periods. Implicit in the use of $(\Delta NFA_t/\Delta S_t)$ in the sales growth rate model was the assumption that depreciation was sufficient to maintain the earning power of the assets. Historical cost depreciation charges are less than replacement cost charges during periods of inflation, and inadequate to recover the lost economic value of the depreciating assets. Both profits and taxes become overstated in inflationary periods with historical cost depreciation.

The underdepreciation of fixed assets can be incorporated into the financiable growth rate model by changing somewhat the definitions of funds available to finance growth [basically, $(rS_t)(1-p)$], and the need for funds to finance net fixed asset growth $(\Delta NFA_t/\Delta S_t)$. One approach would be to expand the meaning of r from (EAT_t/S_t) to $[(EAT_t + \text{Depreciation}_t)/S_t]$; and simultaneously put the need for funds to finance fixed asset growth on a gross $(\Delta GFA_t/\Delta S_t)$ rather than net $(\Delta NFA_t/\Delta S_t)$ basis.

Following [6], another alternative is to independently determine the average annual fixed asset acquisition required for expansion and replacement and express this quantity (ΔFA_t) relative to the increase in sales (ΔS_t). Operationally, this approach would emerge as a multiple

k ($k > 1$) of the $(\Delta NFA_t/\Delta S_t)$ factor. This latter method is the approach followed here.

The impact of inflation upon a firm adverse to selling equity, such as Company X, is to slow the financially feasible sales growth rate. Factoring an uniform economy wide inflation rate of f percent per annum into the basic sources and uses logic of the sales growth model leads to

$$(8) \qquad [r(S_{t-1}+S_t)(1+f)(1-p)] + \left[\frac{\Delta CL_t}{\Delta S_t} + \frac{\Delta LTL_t}{\Delta S_t}\right] [(S_{t-1}+\Delta S_t)(1+f)-S_{t-1}]$$

$$= \left[\frac{\Delta CA_t}{\Delta S_t} + \frac{\Delta FA_t}{\Delta S_t}\right] [(S_{t-1}+\Delta S_t)(1+f)-S_{t-1}]$$

which, in turn, reduces to

$$(9) \qquad g_{real} = \frac{\Delta S_t}{S_{t-1}} = \frac{r(1-p)(1+f) - f\left(\frac{\Delta CA_t}{\Delta S_t} + \frac{\Delta FA_t}{\Delta S_t} - \frac{\Delta CL_t}{\Delta S_t} - \frac{\Delta LTL_t}{\Delta S_t}\right)}{(1+f)\left[\frac{\Delta CA_t}{\Delta S_t} + \frac{\Delta FA_t}{\Delta S_t} - \frac{\Delta L_t}{\Delta S_t} - r(1-p)\right]} .$$

The growth rate derived using equation (9) is a real growth rate as distinguished from the nominal rate g* [$g^* = (1+g_{real})(1+f)-1$].

To explore the impact of inflation upon feasible combinations of both real and nominal sales growth rates, inflation rates, and loan maturity periods, equation (9) must be modified to permit identification of the proportion of after tax earnings that will be available to repay a term loan. The modified sales growth model is

$$(10) \qquad g_{real} = \frac{\left[\left[\frac{r}{1-t} - i\,\frac{\Delta L_t}{S_t}\right](1-t)(1+f)(1-p)\right] - f\left(\frac{\Delta CA_t}{\Delta S_t} + k\,\frac{\Delta NFA_t}{\Delta S_t} - \frac{\Delta CL}{\Delta S_t} - \frac{\Delta LTL}{\Delta S_t}\right](X)}{(1+f)\left[\frac{\Delta CA_t}{\Delta S_t} + k\,\frac{\Delta NFA_t}{\Delta S_t} - \frac{\Delta L_t}{\Delta S_t} - r'(1-p)(X)\right]}$$

where

t = income tax rate = 50% for Company X;

i = before tax term loan interest rate = .10+(.5)(f) for Company X;

ΔL_t = the incremental LTL or term loan = \$15,000 for Company X;

X = the proportion of after tax profits retained in the firm that is required to support sales growth;

k = multiple of the $(\Delta NFA_t/\Delta S_t)$ relationship to adjust for the inadequacy of historical cost depreciation charges to maintain productive capacity of firm; and

$r' = [r/(1-t) - i(\Delta L/S_t)](1-t)$.

Knowledge of X permits estimation of the required term loan maturity for Company X's \$15,000 term loan request via the methodology of equation (5).

Exhibit 3 shows the loan maturity to be associated with various combinations of both real and nominal sales growth rates and inflation rates for Company X when all earnings are retained [(1-p)=1]. The data reflect a term loan interest rate that is imagined to vary with the inflation rate (i=.10+.5f). Some correction for the inadequate depreciation problem is achieved by estimating net fixed asset growth to be $k(\Delta NFA_t/\Delta S_t)$ where k = (1+f). The Exhibit 3 maturity and sales growth data demonstrate clearly that modest increments in inflation reduce Company X's real growth capacity and/or lengthen the time period required to repay the \$15,000 term loan.

An Exhibit 3 matrix of feasible inflation/sales growth rates provides both borrowers and lenders a useful indication of plausible maturities for a term loan. Similar matrices using alternative assumptions with respect to the values of r, p, t, i, f, $(\Delta A_t/\Delta S_t)$, and $(\Delta L_t/\Delta S_t)$ can be easily and quickly generated with the financially feasible growth model.

EXHIBIT 3: Loan Maturities and Inflation Rates Consistent with a $15,000 Loan and Sales Growth Rates of 5%, 10%, 15%, and 20% for Company X When the Retention Rate (1-p) Is 1.0

Inflation Rate	Loan Maturity Period with Real[2] Sales Growth Rate (g) of 5%	10%	15%	20%
0 %[1]	1.9 years	2.4 years	3.4 years	6.2 years
5.0%	2.0 years (10.25%=g*)	2.9 years (15.50%=g*)	5.4 years (20.75%=g*)	Borrowing Need (26.00%=g*)
7.5%	2.3 years (12.88%=g*)	3.4 years (18.25%=g*)	9.9 years (23.63%=g*)	Borrowing Need (29.00%=g*)
10.0%	2.4 years (15.50%=g*)	5.1 years (21.00%=g*)	Borrowing Need (26.50%=g*)	Borrowing Need (32.00%=g*)

[1]The 0% inflation row values are the same as the (1-p)=1.0 row of Exhibit 2.

[2]Nominal sales growth rates are shown in parentheses where $[g^* = (1+g_{real})(1+f)-1]$.

These coefficients capture the logic of a borrower's operating, investment, financing, and dividend strategies. Borrowers and lenders need to examine the consistency of a firm's operations and sales growth plans with any proposed term loan maturity. Exhibit 3 type matrices can be used by lenders to examine the sensitivity of the loan maturity value to alternative values of other variables, such as inflation and asset management possibilities, and to identify the possible need for loan covenants. Borrowers can use the model to assess the likelihood and conditions under which such covenants might impinge upon operations.

CONCLUDING OBSERVATIONS

The model developed is no substitute for formal financial projections. However, the model can serve as a useful supplement and a check on the financial consistency of a term loan proposal and the borrower's operating, investment, financing, and dividend plans. The model also has application in assessing the capital flow implications of alternative growth strategies for a firm's divisions and/or product lines.

FOOTNOTES

[1] A target total long term debt to equity ratio (LTD/E) could be maintained by having the increase in long term debt (ΔLTD) expressed as a function of the increase in retained earnings $[r(S_{t-1} + \Delta S_t)(1-p)]$ and new common stock financing (ΔCS), or $\Delta LTD_t = [r(S_{t-1} + \Delta S_t)(1-p) + \Delta CS_t](1+LTD/E)$. An equivalent approach to maintaining a target debt/equity ratio is to utilize directly the $(\Delta LTD_t/\Delta S_t)$ relationship as in equation (3).

[2] A decline in Company X's inventory to sales relationship is to be expected with sales growth. The EOQ formula would suggest a firm's average inventory increases with the square root of sales, so any increase in sales calls for a less-than-proportionate increase in inventory.

The envisioned decline in the inventory/sales relationship on incremental sales is equivalent to expecting Company X's inventory turnover (sales basis) on incremental sales to be 7.94 instead of the average 5.56 turnover.

[3]

$$\text{If } .10 = \frac{\left[\frac{.10}{(1-.5)} - .10\left(\frac{\$15{,}000}{\$100000(1+.10)}\right)\right](1-.5)(1-.5)(X)}{.50 - .05 - 0 - .0466(X)}, \text{ then } x = .8779.$$

[4] The example Company X had no outstanding long term debt prior to the proposed term loan. Outstanding long term debt and the associated interest and principal debt servicing requirements could easily be incorporated into equation (4) by expanding the definition of r' to be after tax profits retained in the firm less principal debt service on outstanding debt.

[5] Actually the growth rate of the available repayment quantity will exceed g slightly starting in period t+1. This occurs because loan interest in time t+1 is less than in time t.

[6] The maturity estimation logic is amenable to other payment configurations.

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